

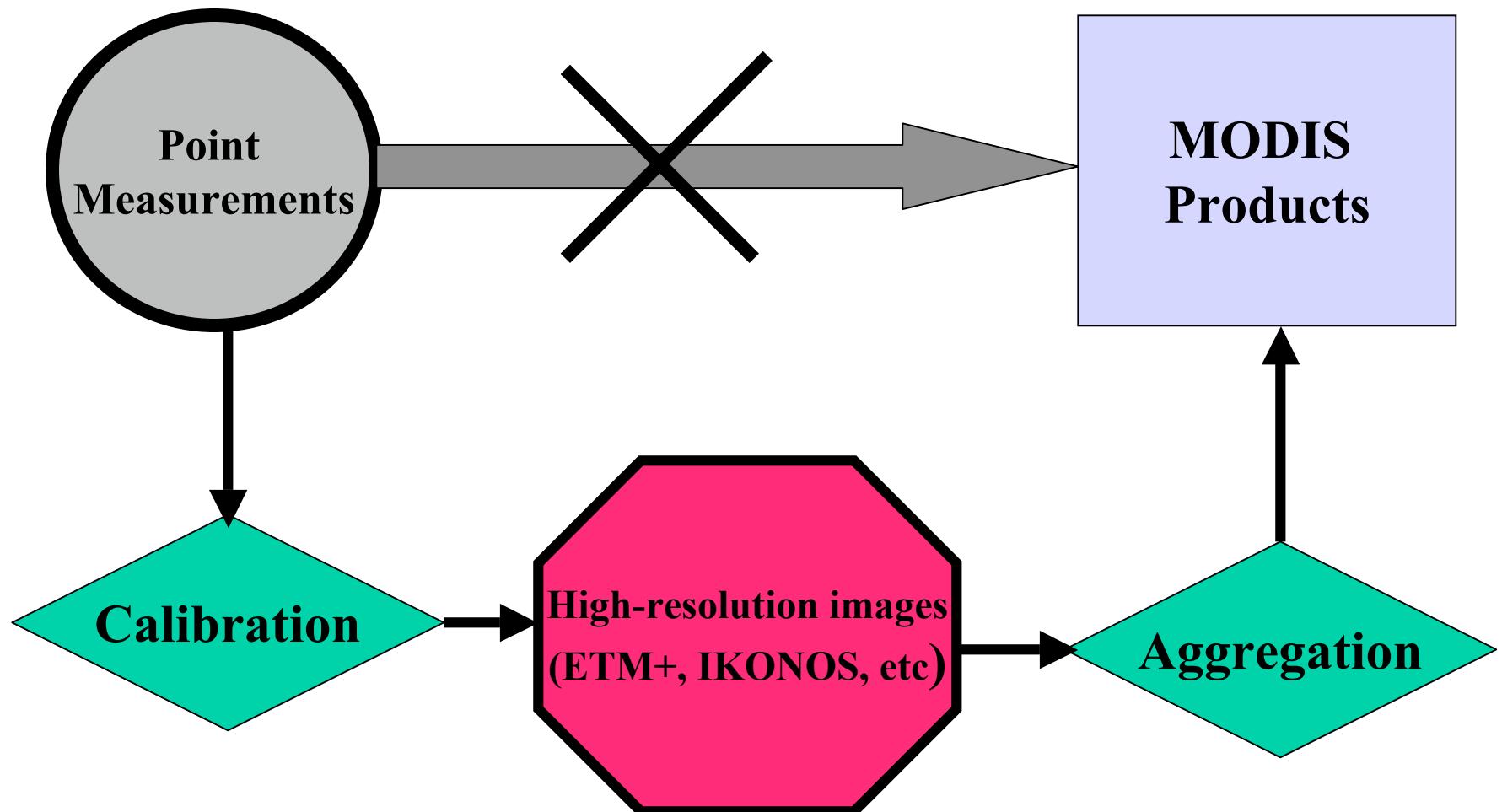
MODIS Products and Validation Methods

- MODIS products:
 - MOD43: albedo
- Validation Methods:
 - field campaigns at BARC, Maryland
 - scaling up from high-resolution imagery
 - comparisons with independent algorithms

Data Collection at BARC

- Airborne data collection at BARC
 - POSITIVE system, AirMISR, MAS, ASIA, AVIRIS
- Satellite data collection at BARC
 - ASTER, IKONOS, TM/ETM+, ALI/Hyperion/EO1
- Ground data collection at BARC
 - Reflectance spectra - ASD
 - Broadband albedos (albedometer)
 - LAI & leaf optics
 - Leaf biochemical properties

Up-scaling



MODIS Albedo
Validation

Liang, Shunlin



UNIVERSITY OF
MARYLAND

Algorithm Development

□ Atmospheric correction

- Liang, S., H. Fang, M. Chen, Atmospheric correction of Landsat ETM+ imagery, I. Method, *IEEE Trans. Geos. Remote Sens.*, 39:2940-2948, 2001
- Liang, S., H. Fang, J. Morisette, M. Chen, C. Walthall, C. Daughtry, and C. Shuey, Atmospheric correction of Landsat ETM+ imagery, II. Validation and applications, *IEEE Trans. Geos. Remote Sens.*, in press

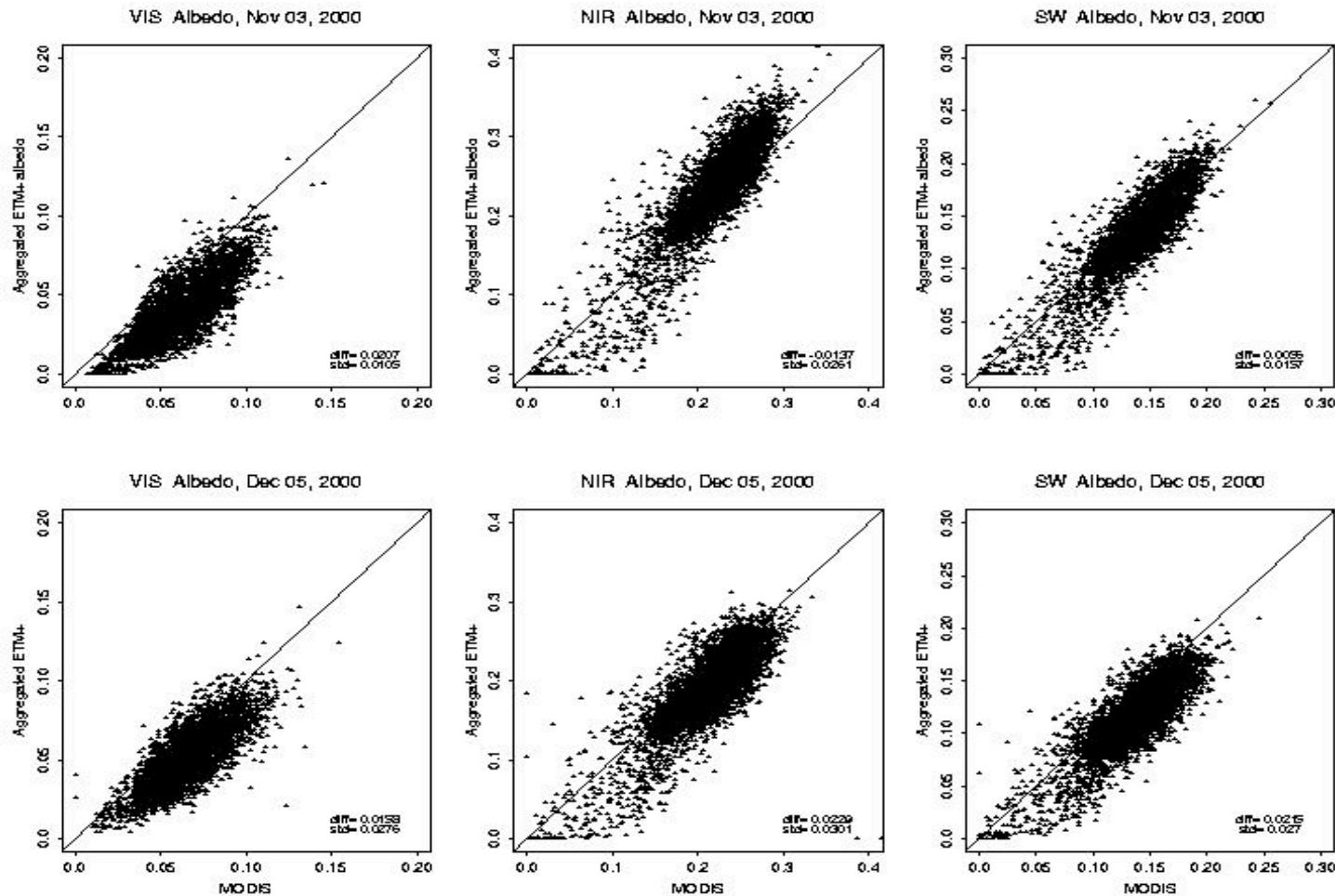
□ Narrowband to broadband albedo conversion

- Liang, S., Narrowband to Broadband Conversions of Land Surface Albedo. I. Algorithms, *Remote Sensing of Environment*, 76, 218-238, 2001
- Liang, S., C. Shuey, A. Russ, H. Fang, M. Chen, C. Walthall, C. Daughtry, and R. Hunt, Narrowband to broadband conversions of land surface albedo. II. Validation, *Remote Sensing of Environment*, 84(1):25-41, 2003.

□ Aggregation laws

- Liang, S., Numerical Experiments on Spatial Scaling of Land Surface Albedo and Leaf Area Index, *Remote Sensing Reviews*, 19:225-242, 2000

Validation Results

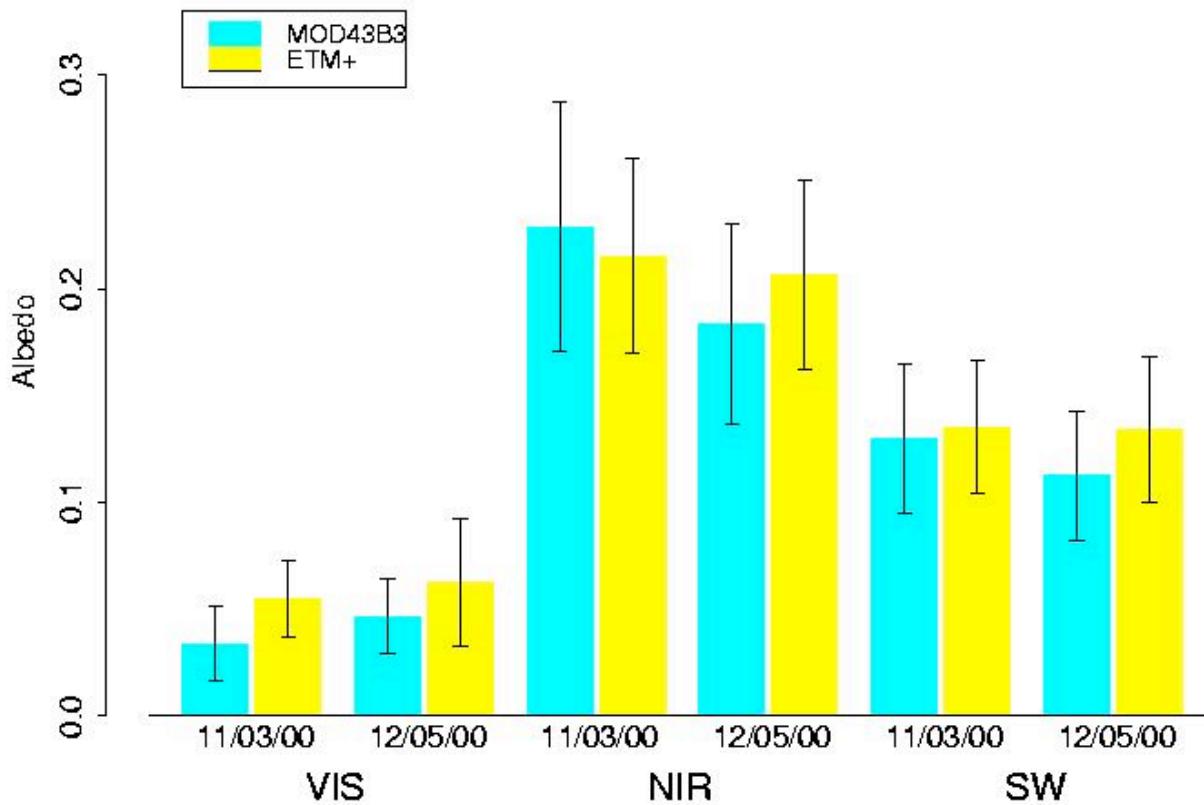


MODIS Albedo
Validation

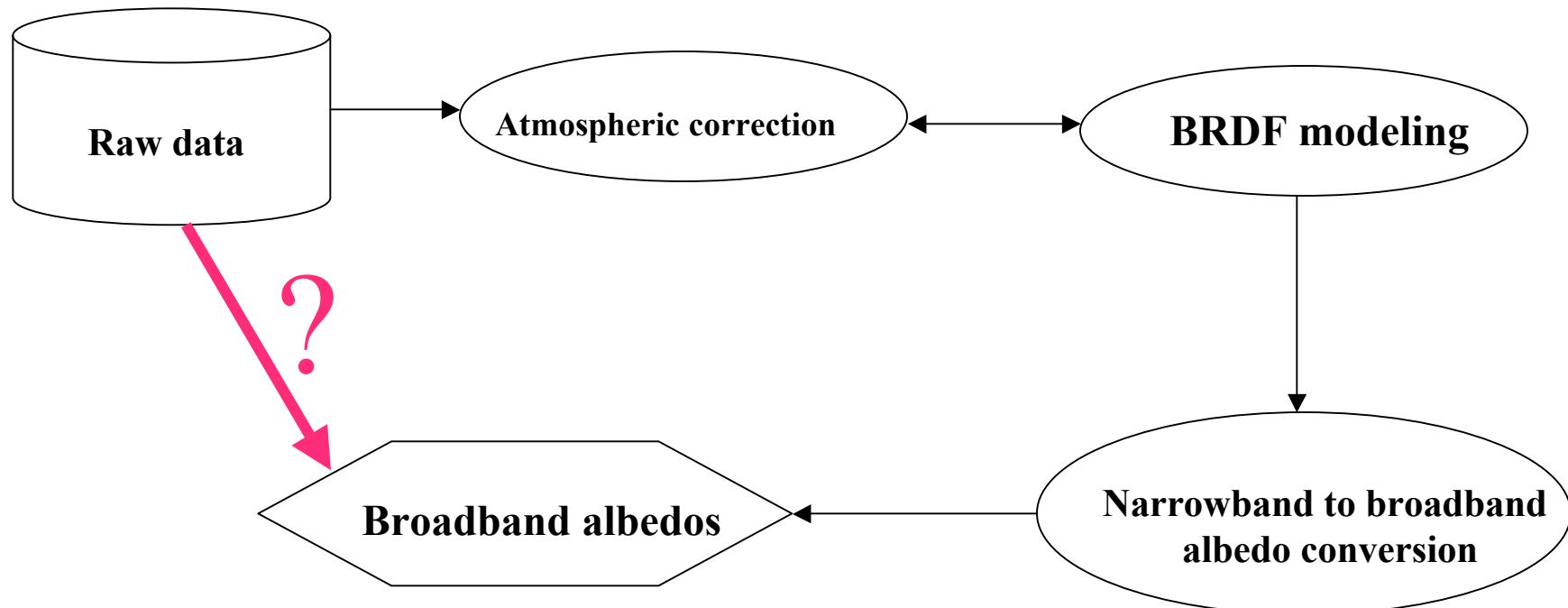
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Validation Results



An independent algorithm



Liang, S., A direct algorithm for estimating land surface broadband albedos from MODIS imagery, *IEEE Trans. Geosci. Remote Sen.*, in press

Lessons learnt

- Validation projects should be formed after the primary products start to be produced.
- Close communications and collaborations between the instrument Science team PIs and validation teams are critical
- Validation is not equivalent to field campaigns. Algorithm development and data analysis are not less important
- Validation sites need to be determined carefully
- Unless the site is perfectly homogeneous, a distributed monitoring network within a region is the best
- Field measurements
 - BRDF characterization at plot and landscape levels
 - Spectral albedo
 - Broadband albedos
 - visible/near-IR
 - Direct/diffuse
- using high-resolution imagery and scaling
 - Up-scaling methods
 - Downscaling methods
 - Linear unmixing
 - Continuous field generation
 - Temporal profile decomposition
 - Multiresolution data fusion
- Algorithms/products intercomparisons